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Letters to the Editor

Shortly after the August issue of our magazine was distributed we were literally avalanched with letters commenting upon our first issue. We have printed below excerpts from some of the letters.

".... now you are publishing material that isn't available in other mineral magazines. I believe that the magazine will meet a most grateful audience."

> F. C. Kessler, Canon City, Colo.

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to page 24

LAPIDARY EQUIPMENT & SUPPLIES Horizontal Laps Diamond Saws Grinding Arbors Faceting Heads Minerals Micromounts Catalog – 10c – Refund on first order.

COVER PHOTO

We received many compliments on our August cover photo. The photo which appears on the cover of this issue is as good if not better than the August photo. Both were taken by Mr. Howard Gresely Harrell of Omaha. The subject Mr. Harrell chose for this issue is the Grand Canyon of Wyoming. The picture which was taken a little south of Devil's falls has remarkable depth and perspective. Part of this was due to the use of a K2 yellow filter. Mr. Harrell uses a Kodak camera with a F 4.5 lense. For the October issue we hope to have an interesting photo by Mr. W. F. Keller of the University of Missouri

Notes on Colorado Minerals

by Victor Shaw FOREWORD

On this brief paper dealing with minerals of Colorado, it perhaps is not necessary to devote much space to detailing the genesis of minerals collectively, with the exception of a few comments on basic geology indicating how they were formed. Possibly, to students of earth science during field expeditions, this may prove of some benefit with respect to mineral discovery and recognition.

Thus it may be recalled that geological scientists, both American and foreign, long ago discovered and confirmed the existence of what they termed "magma" within the earth's crust. In other words, great local masses of molten matter from which igneous rocks are derived, together with a diversity of minerals in fluid and gaseous form. Further study served to crystallize the fact that volcanic action had structural weakness to form fissures, cracks, and seams, of more or less width and extent, into which the ceaseless internal earth pressure injected this hot magmatic material, thus forming our great batholiths, local laccoliths, and the many stocks, cupolas, dikes, veins, and so on.

Naturally, the resultant forms assumed by these magmatic injections when cooling, depended upon the size, shape, and extent of the fissures through which the hot material was forced. All of this magma when injected, being molten rock containing all the many types of gem and other minerals in fluid form, cooled and crystallized quickly or slowly, and either deeply or near the earth's surface, due to local conditions. Rocks that have crystallized at depth were termed "plutonic"; but if extruded upon the surface, they were given the distinguishing term "volcanic rocks."

Geologists also exploded the early theory that the earth's interior is a fluid molten mass. Rather, intenstive study revealed the fact that these hot internal masses of magma were localized, and that a majority of internal rocks are massive solids, similar in structure and appearance to the same types seen on the earth's surface. The reason for this assumption is that internal rock undoubtedly has an average structural density far greater than surface rock, due to tht enormous gravitational pressure exerted by the earth's crust, estimated at an average thickness of some 2,500 miles.

This immense pressure produces kinetic heat in direct ratio to an increase of depth, as recorded by deep borings into the earth's crust. But the central rock, probably due to an absence of free oxygen, has a raised resistance which prevents melting. Hence the molten areas exist only where the vast pressure is relieved by uparching of the crust under the numerous systems of mountain folds.

It must be noted, however, that this is theory only and is accepted by earth scientists as the most logical explanation, since it conforms with evidence thus far supplied by modern research. But the fact remains that the true condition of our terrestrial center still is one of the fundamental problems awaiting solution.

Now, as with the basic geology here outlined, the science of petrology in this paper concerns only the

most common type of igneous rocks, namely granite, of which our batholiths are composed. A fine example is the extensive batholith of western Canada, which reaches westward through British Columbia to include a large portion of Alaska. Another striking example is the gigantic cordillera of the Rockies, which runs in a northeast and southwest direction in central Colorado. Also it seems advisable to mention here the well known Pegmatite granite occurring in dikes, or veins, which constitutes one of the best known sources of non-metallic minerals, common or rare.

True granite, an acid plutonic rock, is medium grained, or at times coarsely grained, though it all has an even texture and usually is light in color; but in some instances there are reddish, gray, or pale yellow granites, dependent upon the types and amount of feldspar or silicates involved. Included non-metallics in most cases are quartz, orthoclase, or plagioclase, or microcline, and muscovite, often with such minor accessory minerals as hornblende, biotite, augite, or albite.

The pegmatitic variety occurs as fissures, dikes, or veins of more or less width intruding areas of true granite. Some zones of pegmatite known are over a mile wide and many miles long, although these are not usual. The difference between this junior intrusive pegmatite dike and the enclosing senior true granite is chiefly that, although the dikes have a mineralization similar to true granite, they exhibit a far coarser crystallization due to cooling at a slower rate.

Other features of difference include: (a) pegmatite crystals usually were developed at the same time; (b) such dikes often show a banded structure, with layers parallel to the dike walls; (c) the pegmatite gangue may be chiefly feldspar, or perhaps chiefly quartz; (d) pegmatite dike structure usually has along central portions numerous vugs (cavities) lined with crystals of diverse types such as beryl, tourmaline, topaz, apatite, amethyst, flourite, and other minerals. Among these other minerals are tantalum, molybdenum, lithium, spodumene, columbium, cassiterite, monazite, triphylite (a bluish ironlithium-manganese phosphate) and other minerals of interest to collectors.

ORE MINERALS

Speaking generally Colorado is one of our most richly mineralized states, and it probably rates the first place with respect to the remarkably diverse types of its minerals. Pegmatites are numerous and widely scattered, but other rock formations like andesite, rhyolite, and basalt, have an abundant variety of metallic and non-metallic minerals, particularly with respect to its wealth of high grade commercial ores, in mines distributed throughout the central cordillera.

A list of these ores includes those in which gold predominates, which range from free gold in quartz, to ores having gold associated with various base ores and particularly the rich gold tellurides such as sylvanite, calaverite, bessite, krennerite, nagrargite, petzite, etc. Also most types of silver ores, such as argenote, stephanite, pyragyrite, proustite, cerargerite, and native silver - many types of lead ore, like galena, cerrusite, anglesite, argentiferous galena, and the rarer pyromorphite - a lead phosphate-chloride, colored green, brown, or yellow, and crystallizing in the hexagonal system. Most of the numer-

ous kinds of copper ore: chalcopyrite, bornite, cuprite, malachite, azurite, tetrahedrite, chrysocolla, and native copper - the chief types of tungsten ore: wolframite, huebernite, ferberite, and scheelite; often appear associated with base metal ores, or in gold - bearing quartz and the zinc ores: sphalerite, smithsonite, and zincite.

Added to the above Colorado produces many rare ores such as molybdenite, of which the mountainous deposit at Climax, near Breckenridge, Summit County, is said to be the world's largest deposit; and the radio-active ores uraninite and carnotite, vanadinite, stibnite, cinnabar, chromite usually in olivene rocks altered to serpentine, limonite and hematite, manganite magnetite, the manganese ores pyrolusite and psilomelane, some platinum, and pentlandite (an iron -nickel sulphide) - an many nonmetallics, with a huge variety of gem minerals.

Among the non-metallics must be listed extensive deposits of excellent bituminous coal, in sediments fringing both sides of the central igneous intrusives, a high percentage being in southern and southwestern counties covering many hundred square miles. Yet deposits have been worked in other counties, one very notable being in Ouray County at the head of the Uncumpahge River canyon, where a tongue of sedimentaries is thrust into the eruptive zone from outlying sandstones to the west and northwest. This is a high grade coal, of low sulphur and ash and so clean it has been handled with white gloves showing no stain. When examined by this writer, a measured 40 feet of clear coal was exposed, although obviously the deposit was much thicker. At that time, due to under-selling by a large company, it had been reduced

to the status of a wagon mine, though it still was independent. Much Colorado coal has been owned or controlled by big interests.

This State also has commercial iron deposits in at least 20 counties, for the most part those lying to the north, west, and south of the great central belt of igneous intrusives.

Referring to the above ore minerals, a separate paper would be required to deal with them, but complete data including names, locations and mineralization are recorded in government publications always at hand in public libraries of large cities (vide: Mineral Resources of the U. S., Part 1, years between 1910 and 1920, especially.)

THE GEM MINERALS

Colorado gem minerals are widely scattered and exceedingly diverse, as has been noted heretofore; in fact, many books have been required to adequately describe them all. However, at least an indicative list may here be given of the common and rare gemstones. These will include those in east-central counties where sediments contact the central volcanics, such as Park. El Paso, Chaffee, Fremont, Mineral and Saguache; and southwestern counties in a similar contact zone. which include Montrose, San Miguel, Dolores, Montezuma, some parts of Gunnison, with some northern and northwestern counties. Directions to specific areas are given, where details can be obtained locally.

One of Colorado's characteristic gemstones is the amazonstone: a fine blue-green variety of microcline,often mistaken for jade and even sold by dealers as "Pike's Peak Jade." It occurs in various parts of this State, but the chiei areas are near Pike's Peak, in western El Paso Sounty, near Colorado

Springs; at Crystal Park, near Manitou; Crystal Park near Florrisant; and also at Devil's Head. Pike's Peak localities are reached by the road to Cripple Creek, from the Springs. Six miles from the Springs on this road is St. Peter's Dome, a collector's field, which is rich in amazones.

The best deposit of lapis lazuli in North America occurs high on snow- crested Italian Mt. in Gunnison County. For collectors, a journey there is a "must", to secure specimens of this histrical rich blue gemstone, be-spangled with golden pyrite and dots of white calcite.

One of the most important minerals in this State is pearceite, an arsenic variety of polybasite: fine crystals of which occur in many silver mines, though at their best in the Molly Gibsan at Aspen in east-central Pitkin County, where it carried the bulk of the silver ore of this rich mine, once the State's largest silver producer.

St. Peter's Dome, near Colorado Springs, just mentioned above, offers a variety of fine minerals which make it a paradise for collectors. Among these are two rare minerals not found elsewhere in the United States. One is astraphyllite, in slender pearly blades of a beautiful gold-bronze color; the other being the translucent snowy mineral, cryolite, or "ice stone" of the Greeks. It is not here in commercial quantities, although good specimens may be obtained. The only known operating world's cryolite mine is at Ivigtut, at the head of Arsuk Fiord, in southwestern Greenland.

Other gem minerals on this "Dome", include amazonstone, topaz crystals, rutile, phenacite, fine translucent green-purple fluorspar, red-pink-cream feldspar, and nice crystals of augite, also the amphibole, hornblende, in crystallic form. The Dome is a basalt intrusion in red granite, and fine specimens of red earthly and metallic grey masses of hematite are common. Near the base of the eastern and southern slopes of the Dome are many old mine diggings, and on their dumps may still be found fine specimens of argentiferous galena in a matrix of the fluorspar mentioned above.

Another excellent source of gem minerals is the "Three Gem Hills" -Ruby, Sugarloaf, and Dorothy, near Nathrop in the Royal Gorge, about 17 miles north of Salida on Highway 285, in Chaffee County. The hills are rhyolite outcrops intruding pre-Cambrian metamorphics. The best mineralization occurs on Ruby Mt., rising just across the Arkansas River opposite Nathrop, more easily reached in the low waters of late summer. This hill is about the length of a lode mining claim (1,500 feet) and is only 200 feet high. Sugarloaf lies a half mile to the northwest, up a creek ravine; and Dorothy, a smaller hill, is farther off on the western side of th Arkansas River.

The bases of these three hills are buried in rock slides. Ruby Mt. shows rhyolite above, but above the slide rock on its north and southeast slopes exposures occur of lustrous gray pearilite, with lumpy inclusions of jetty obsidian, locally "black rubies"; while the numerous garnets, known as "red rubies," have rolled out of countless vugs all around and may be picked up by the thousands.

Sugarloaf and Dorothy are chiefly porphyritic rhyolite, with phenocrysts of smoky quartz and glassy sanadine crystals; and numerous vugs, locally "stone bubbles", are lined by drusy quartz and clear, or grayish sanadine, which has black films of manganese oxide in cava-

THE GEM CUTTERS' CORNER



SNOWFLAKE OBSIDIAN

Obsidian would not ordinarily be considered a semi-precious gem stone. However when the coal black background of obsidian is broken by highly contrasting white snowflake-like patterns the stone breaks into popularity and into the gemstone class. One can imagine with ease, when looking at a slab of this gem material, the coal blackness of a winter's night broken by an occasional drifting flake of That other imaginations snow. have run high at the sight of this material is attested by such names as "Night Blooming Cereus," "Birdseye," and "Flowering Obsidian."

The black portion of this stone is very opaque for obsidian showing little or no transmitted light on thin edges. The white areas are sperllites, the results of incipient crystallization, and very probably containing some feldspar or other mineral. These light areas show no variation in hardness with the rest of the stone.

This material works up best in large cabochons for bracelets and pendants. Since the designs are large for the most part they do not show up well in small stones that would be used for rings.

The hardness is about 5.5, and no difficulty will be encountered in obtaining a high polish with the usual polishing agents. The author gets best results by polishing first on a felt with tripoli and finishing on a felt with cerium oxide. Care must be used in sanding since scratches in the black obsidian show up strongly when filled with the white polishing agents.

Flourissant, Colorado

PART I

of

"FAMOUS FOSSIL LOCALITIES"

One of the most interesting fossil localities ever to be discovered is Flourissant, Colorado. Just west of Colorado Springs, and seven miles north of Cripple Creek, Flourissant lies in a pocket on the continental divide. During Miocene times a lake five miles wide and twelve miles long filled the valley where Flourissant now stands. Southwest of Flourissant is a high hill, which during the Miocene was an active volcano. Immediately surrounding the lake was a dense growth of trees and flowering plants. Now, the remains of these plants may be collected in abundance in the shales near the town. The plants are remarkably well preserved, showing minute details of leaf and stem structure. Plants, however, werent's the only inhabitants about this lake. Insects, spiders and other arthropods thrived in the Flourissant forests. Their remains are also preserved in the Flourissant shales. Occasionally fish fossils are collected in the lake bed, although they are considerably rarer than the plants and insects

A short distance from the lake deposit are two occurrences of fossil trees. Both have been commercialized and are called "The Henderson Petrified Forest" and "The Colorado Petrified Forest" respectively. Sequoia trees are the most common in both places. The wood is for the large part silicified. fragments may be collected that have been covered by lava flow. Specimens of this type are on exhibit at the Colorado Museum of Natural History at Denver. Also, many specimens of the flora and fauna from the lake bed are on exhibit. Collectors who pass through Flourissant and wish to procure specimens can easily collect from the shales along the side of the highway just east of town. Collectors who plan to stay for any length of time should have camping equipment because there are very few facilities in Flourissant. The following equipment is desirable for collecting the shale fossils:



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- 1 Bryon shovel
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- 1 Magnifying glass (10 power)
- 1 Geologist's pick

Quantities of newspaper

- 1 pint of 7% cellulose acetate solution
- 1 Hand spray gun (Fly spray type will do)

NEW OPAL DEPOSIT

United Press dispatches from Melbourne recently have given sketchy information about a new opal deposit in north Australia. This deposit was supposedly uncovered by a native of the Mompey tribe. Thus far about \$20,000 worth of opal has been removed from this new field and from all indications considerably more will be mined within the next few months. This will be good news to gem cutters who have been having difficulty obtaining opal. The discovery should have a pronounced effect upon the American opal market before the first of the year.

Gem quality opal was first found in Egypt. Deposits were later found in Hungary. During the middle ages the opal mines at Cernowitz, Hungary were the world's chief opal supply. During the 1800's Mexican fire opal was first used commercially. In 1904 several deposits of black opal were found in the White Cliff region of New South Wales. These were undoubtedly the best opals ever to be mined. They had wonderful color which varied from flame red to oil green intermingled with sky blue lights. One of these opals sold for \$9500 in 1923. In the period from 1904 to 1935 an estimated \$4,000,000 worth of opal was marketed from this source alone. In Germany during the 1920's imitation black opals were produced by treating common fire opal with a dilute solution of sulphuric acid. The treatment was complex and often required weeks. The imitations produced were poor and could be detected by an expert.

As soon as we have more information about this new deposit we will print a full length article, complete with photos of the opals in rough and cut.

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ELEMENTS OF GEOLOGY Part II EROSION by R. B. Berry

Most current geology texts either deal insufficiently with the subject of erosion, or disguise it under a multitude of technical terms that make it difficult for the beginner to understand.

Erosion is briefly defined as the gradual destruction or eating away of land and rock masses. There are two different types of erosion: Wind Erosion and Water Erosion. In the course of geologic tome wind erosion hasn't played as important a part as has water erosion. At the present time, however, wind erosion has a profound effect upon world economy. Wind if not properly controlled can lift up and carry away immense qauntities of high This often times grade top soil. leaves a barren desert-like land surface that is of little or no value for farming. For this reason many governments have projected far reaching soil conservation programs which include means for combating wind erosion. One method which has been utilized and that seems to meet with universal approval is the planting of shelter belts of trees at intervals of one or two miles in farm country. These belts help to cut down the velocity of the wind and thus reduce its power to sweep up and carry quantities of soil.

Another form of wind erosion which isn't as important as it is interesting is wind abrasion. Wind in or near deserts usually carries fine sand. This wind blown sand will carve rocks into grotesque shapes and sometimes will remove the less resistant rock formations in their entirety. If the sand is dust fine it may put a high polish on rock. Pioneers who found polished rocks of this type attributed the polish to the work of early indians.

Water Erosion

There are two main types of wawater erosion. The first is rain and river erosion. The second is erosion by moving ice and snow. Many scenic features are the result of rain and river erosion. Perhaps the most prominent examples of this type of erosion are the Bad-lands of South Dakota, the Grand Canyon, and Niagara Falls.

The unusual topography of the Bad-lands was caused for the most part by heavy rainfall. The rain washed small gullies into the land surface. With later rains these gullies were enlarged and deepened. Eventually water wore through the layers of the least resistant rock and created the thousands of small canyons that form a lattice-work throughout the Bad-lands. The most resistant rock remained as dome-like structures which are even now being attacked by erosion. The Grand Canyon was created by the fast moving Colorado river which wore through successive layers of rock until it attained a maximum depth of 5000 feet in some places. The step-like slopes of the canyon are due to differences in the hardness of the rock through which the river cut

As striking as the Grand Canyon may seem, geologically it is still a "young" valley, because the river is still lowering the base level of the canyon and must continue to do so until the Colorado Plateau (the river's drainage basin) is lowered to the base level of the river. Niagara Falls is a good example of what happens when water passes rapidly over rock of varying resis-

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tivety. In this case the Niagara river passes over areas of alternating shale, limestone, and sandstone. The shale and sandstone were quickly eroded away and the result was a series of rapids. These rapids after a period of time developed into small water falls. The water wore away the rock at the base of the falls which in turn increased the length of drop of the water, which in turn increased the wearing power of the water, etc. The maximum height of the falls at this time is between 160 and 170 feet. This is especially great considering the tremendous amount of water that flows over the falls.

Igneous rock is least affected by running water. Because of this igneous dikes and intrusions sometimes stand high above the surrounding country side. The less resistant rock that surrounded them has been worn away leaving only the hard igneous rock. The plugs of extinct volcanic vents sometimes form mountains of considerable height when the surrounding rock has been eroded away.

A peculiar result of erosion is the natural bridge. If there is a joint through a section of rock that accommodates water flow, it will be enlarged gradually until the flow has reached a maximum. In some cases this will leave a bridgelike arch of rock. These bridges are found in many places in the United States.

Ed Note: Next month's article by Mr. Berry will deal with glacial erosion and its effects upon the North American Continent.

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Ferns, Moss, Plume, Flower, Iris, Banded, Clear, Milky, and Pictures, with beautiful bright colors, just as nature made them. All Arizona agate and jaspers come from mines owned and operated by no one but Chas. E. HILL.

#### NO PRICE LIST

From now on I will have no price lists, just send \$5.00, \$10.00, \$25.00, or any amount, be sure to tell me just what you would like, rough or sliced gem material, the quality,the colors, the size chunks, the kind, like scysocolla, malochite, agate or jasper, iris agate, banded and so on, we have all colors, we have gem geodes sold in slices, halves or chunks, we also have some amethyst crystals, turquoise, petrified wood, opal and opalized gem, and many other kinds of rough gems.

#### GEM TESTED

Each and every chunk is tested for gem quality before shipping, so from now on all gem material will be of a finer gem quality. My agate and jaspers break smooth and slick and take a fine lustrous polish that will last for years without scratching, the hardness runs from 6 to 9.

#### NEW GEM STOCK

We are mining new gem material from place of formation on my claims at all times, so we should have a fine gem stock to select from on hand from now on. Chunks will be sawed or sliced to order.

#### SORRY

I haven't had time to answer all the nice letters you folks have written me. telling how beautiful and how well you like my Arizona agates and jaspers. I have more than I can do filling orders, and working my agate and jasper mines, please remember that I do all this work myself.

#### THANKS

To all who have ordered gem material from me, and thanks for all the nice things you say about my flower, fern, moss, and picture agates and jaspers with the many beautiful colors, I like them myself and think they are the best in their class.

#### SATISFACTION OR YOUR MONEY BACK

To everyone who has written me asking about the kind of moss, ferns, plumes, flowers, pictures and colors, of my Arizona agates and jaspers, well all I can say is they are more beautiful than I can describe, the flowers, moss, ferns, and pictures are there you don't have to take a second look, they are easy to see, and the colors are bright and beautiful. Anyone who is not satisfied just return the order complete within 5 days and I will refund your money, you pay the postage.

#### SPECIAL NOTE

Some people think they can send to another state or dealer and buy the same agate and jasper or some just like it, but this is not true. I own the mines and work them myself, no state or no one unless they have bought from me have exactly the same gem material with the same colors, moss, ferns, and flowers, I have many different kinds and colors of agate and jaspers all coming from my mines.

#### RARE BEAUTIFUL GEM

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KEN-DOR ROCK ROOST



Pictured above is a part of the mineral display at the Ken-Dor Rock Roost at Modesto, California. All of the specimens are housed in glass faced cabinets. Flourescent lights have been installed overhead to provide ample lighting for the specimens.

The Rock Roost is owned by Mr. and Mrs. K. B. McClure of Modesto. They have been collecting fine mineral and rock specimens for a number of years. Seven rare pieces from the old Dr. Rung collection are included in their exhibits. These particular specimens were collected over one hundred years ago. The McClures have a 22 inch diamond saw and a 37 inch lap wheel. Their oddress in Modesto is: 419 So. Franklin St.

SULPHUR SPECIMENS

Beautiful specimens of sulphur crystals and unusual sulphur stalactites and stalactites may be collected in Sulphur cave at Steamboat Springs, Colorado. The cave is open to collectors and has never been commercalized. It is located just south of the Yampa river on the outskirts of Steamboat Springs. Collectors should use care in entering the cave as it is sometimes filled with carbon dioxide gas. In windy weather it is generally safe to enter.

Mr. Bennett Goes to China

Mr. B. H. Bennett, formerly editor of this publication, will leave sometime next week for Saigon, Indo-China. Mr. Bennett has been appointed special representative of Pan-American Airways in Saigon. We wish him every success in his new position.

A. Ailen Graffham of Ottawa, Kansas will assume Mr. Bennett's place as editor. Mr. Graffham has been interested in the earth sciences fir some fifteen years. In 1940 he was appointed Assistant Curator of Invertebrate Paleontology at the University of Kansas. He ahas also done field work for the U. S. Geological survey. His papers on mineral and ge msubjects are not unfamiliar to those in the earth science field.

NOTE3 ON COLORADO MINERALS from page 6

ties of specimens. Also garnets are common here, with many occurring on several inner sides of the same vug, and all are the spessartite type, ranging in size from small up to 10 mm in diameter.

In addition, numerous topaz crystals abound, in color ranges from rich to pale yellow, pale blue, or clear transparent white, in sizes from 3mm to 12mm, which afford excellent cutting material. A great many of these crystals are found attached by their sides inside the vugs, and double-end crystals are very common.

Many of the places mentioned were visited by this writer on extended saddle trips, more especially in the southwestern counties, one region being the upper Rio Grande River country, in Rio Grande and Mineral counties. Gravel banks along this river in Mineral County frequently have opal geodes ranging from a 3-inch diameter upward. Some of the geodes found about 15 miles north of Loma, Rio Grande County are agate lined with fine amethyst crystals; but some of the white opal type found north of Creede, occasionally yield fire opal of high grade.

From Loma, on the Rio Grande Southern R. R., one can ride or drive upriver through Wagon Wheel Gap, to the famous old silver camp of Creede, once noted for its high grade silver ores with native silver, and where Jesse James was killed by his henchman, Ford. Creede mines, the Chance, New York, Amethyst and others, were long ago exhausted and turned over to leasers, but mine dumps still reward an industrious searcher with fine specimens of high grade ore, and matrix amethyst crystals of the finest type known in this State.

The writer also forked a saddle into the aradox Valley country, in western Montrose County, where he secured fine specimens of the canary-yellow, chalklike mineral. carnotite, which occurs with uraninite (pitchblende) in amorphous masses in crevices of the gray sandstone country rocks, along the San Miguel River. Carnotite, a hydrous uranium-potassium-vanadate, is highly radio active and its composition is varied, the uranium from 521/2 to 57%, the vanadium oxide from 19% to 21%. At the time of the writer's visit shortly after the turn of the century, the deposits were being mined as vanadium ore; but separation of vanadium from the uranium oxide being difficult, the ore mined was sold at prices based on the uranium content. Only sporadic attempts then were made to recover the uranium.

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DES MOINES MINERAL CLUB

One of the newest and most progressive of the earth science groups is the Des Moines Mineral and Gem Club. The club will meet Monday night, September 2nd to elect officers. The secretary of the club is Mrs. R. G. Hays of Des Moines, Iowa.

HAUSER BED GEODES and agate nodules from the Little Chuckawalla Mountains in the heart of the desert.

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where carnotite commercially occurs is in eastern Utah, in Uinta, Garfield and Washington counties, where also it has been mined. In Colorado it also occurs in Montezuma and Do.ores counties. It has been identified in one other place, a mine at Mauch Chunk, Carbon County, Pa., where it appears irregularly as a yellow stain on wall rock.

Pitchblende, the largest deposit in the U. S., occurs near Central City, Gilpin County, usually associated with pyrite and of a compact type, sometimes altered to a yellow, hydrated oxide.

Another saddle trip was into the San Luis valley, in eastern Saguache County, where there are two turquoise mines. One near Manassa, on the lower San Luis River, is the King Mine of which the production of gem quality turquoise made this State second only to Nevada. It was mined in early times by Navajo Indians, whose silver smiths in even the writer's time used this turquoise to set in rings, bracelets, and ornamental silver necklaces they hammered out. All of this is true also of the second deposit, for up the river valley at Villagrove. Both deposits have the rare sky-blue translucent turquoise of gem quality, beside the common blue-green matrix material.

Turquoise, a hydrated aluminum phosphate with about 5% copper, occurs in this country only in desert, or semi-arid localities, much resembling opal in its mode of occurrence: i. e. as nodular masses, or more usually in compact form filling seams and crevices in igneous rock. It occurs chiefly in quartzite or granite; but the granitic mineral is usually too soft for use as gems, the best of it like that found in San Luis valley occurs in quartzite. For use in jewelry this mineral is always cut cabochon, and it takes a fine polish.

Beside the specimen flourspar mentioned in St. Peter's Dome, Colorado produces fluorspar from a score of operating mines in Custer, Gilpin, Boulder, Mineral, and Jackson counties, with the one in Mineral County on the upper Rio Grande River, 1¼ miles southwest of Wagon Wheel Gap usually having the largest output. This mine, owned by the Colorado Fuel & Iron Co., has shipped all its product to the steel plant, at Pueblo, and the owners often bought the output of most of the other mines: chiefly one near Jamestow, Boulder County, and the Blue Spar mine, in Custer County. The mine in Jackson County, 3 miles northwest of Northgate, has had an annual yield of 15,000 tons, making it one of the chief producers. The Blue Stone, Gilpin County, has good tonnages of flourspar averaging between 93% and 94% CaF2.

Colorado also has scattered deposits of gypsum, but mining always has been relatively small. So far as known to the writer, it is commercially mined in the form of alabaster in but one locality, nor have any finds of selenite been made in the State. There is at least one big sill of massive satinspar that the writer estimated as 20-25 fee thick and of the characteristic yellow-brown color, which is in the high cliffs on the west side of the upper Uncumpahgre River, a few miles from Ouray, in Ouray County. It is not far from the coal deposit (wagon-mine) mentioned above, but at the time of the writer's cursory examination about 1905, no mining whatever had been done.

However, Colorado alabaster is very well known in commercial centers, since this compact finegrained type of gypsum makes excellent carving material. Alabaster has for years been mined in Owl Canyon, near Fort Collins, in eastcentral Larimer County, and elsewhere in that immediate foothill region.

It should be mentioned that Colorado has some deposits of that most peculiar mineral, vermiculite, a hydrated altered mica, which when heated expands in wormlike fashion to many times ite original bulk. This mineral comparatively is new in this State, at least to the general public, yet one of its first processing plants in the United States is at Canvon City. During a recent trip anent a sale of the writers metal mine in San Juan County in 1942, he learned of a new discoverv of this mineral near the head of the Black Canyon of the Gunnison River, in southwestern Gunnison County, but has not visited it. The owner is said to be developing it for active production. It makes a most effective insulating material against fire and both low and high temperatures, when placed in partitions and over ceilings of any type of building.

CHALCEDONY

Colorado chalcedony is found in various forms and in widely scattered localities. A fine agate type having a great variety of colors occurs at Austin Bluffs, El Paso County, 4 miles north of Colorado Springs. Also it is found in sandstone, 10 miles south of Canyon City. Excellent specimens of banded agate are plentiful at Curio Hill, 6½ miles south of Canyon City, central Fremont County. The hill is really a low ridge some 150 feet above the surrounding terrane, an outcrop of Ordovician limestone at the north end of the Wet Mountains on the road to Yorkville.

Very fine agates of a wide range of coloration can be picked up from loose gravel and soil on the top, on the slopes, and around the base of this ridge. They here occur as rounded stones up to 2-inches in size; also in veins and cavaties in the limestone with quartz and calcite crystals. Their translucence, superior coloring, and intricate patterns, make them among the choicest agates in the State.

In another part of this county, 7 miles north of Canyon City at the south end of Garden Park, very good agate may be found in geode form and in veins, also as scattered specimens with jasperized Dinosaur bones. This locality, known as "Fossil Beds," is on the west side of Oil Creek. There are two strata here: an upper stratum containing the Dinosaur bones which is a few hundred feet above a lower zone which furnishes the agates. The best of these are known as the "St. Stephens" variety, which has a very translucent body spotted throughout by scarlet dots, making them particularly fine cabinet specimens.

Some nice moss agate is reported at Williams Fork of Grand River, about 2 miles from the river, in Grand County. What is considered the best moss agate known in the State has been found in Middle Park, north-central Grand County. Agate also occurs as replacements in Atlantosaurus bones at Mt. Morrison, in north-central Jefferson County. on a branch of the South Platte River some 12 miles airline southwest of Denver. Specimens of similar type have been found elsewhere in the State, in Morrison Jurassic sediments, but these are reported as not being of gem quality.

Some very fine fortification agate matrixed upon crystals of amethyst, can be found on the summit of the Animas Range, in southwestern La Animas County.

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Some excellent moss agate occurs near an old salt works, in west-central Park County, not very far southwest of Fairplay. And in the southern part of this county at the Guttey not springs there is some very fine agate of true gem quality. Also some 7 miles west of Guffey at "Thirty-one Mile Mt." is an occurrence of a very beautiful trauslucent pale-blue agate, reported to have been mined to be cut into high grade gems. In southern Park county, between Guffey and Harstel, lies the well known "Agate Plateau" which has furnished much agate of very good cutting quality. And at a bend in the South Platte near Hartsel, there is a deposit of chalcedony, banded white and blue, occurring in the river gravels. This locality is just across the first bridge encountered on the river to the west of Hartsel.

There are many other Colorado minerals, not to be described here for tack of space, for this is a partial list more indicative than complete. Among these is jasper known in at least six counties, some of gem quality in the South Park. Chrysoprase also, with some of gem quality mentioned by Knuz in Garfield County; and much petrified wood in a dozen counties, with some of gem quality in South Park. There are also phenakite, goethite, turgite, manganite, aragonite, analcite, transparent blue barite, etc.

However, it would never do in a paper like this to omit mention of that very rare radio-active mineral, cerite. This mineral is reported to contain as high as fifty-six percent of the rare-earth oxides, beside nine other chemical elements, and is said to be found in but five places in the world. One of these five is in Boulder County, Colorado, which is said to furnish the best and least altered specimens, and incidentally it is the sole American locality; the rest are foreign.

Ed Note—This is the second of a series of articles by Mr. Shaw dealing with noted localities that are of interest to the earth scientist. Mr. Shaw is a noted authority in his field.

NEW GEYSER FIELD



A new geyser field has been discovered near Opal, Wyoming by Mrs. Enda Culbertson of Casper. The field is the sixth that has been discovered. The others are in Iceland, New Zealand, California, Argentina, and Yellowstone Park. This field is unusual inasmuch as the geysers are all "dead". Just the siliceous columns remain.

Mr. and Mrs. Culbertson were tramping over the sage country

when Mrs. Culbertson stumbled on what at first glance appeared to be a petrified stump. This "stump" later was found to be the column of an extinct geyser. The outer shell was composed of a siliceous sinter. Just inside of the outer shell was a ring of grey blue dendritic chacedony. Inside of the chalcedony were masses of rock crystal with the points all pointing inward and upward. It occurred to Mrs. Culbertson that this would be a beautiful specimen for a museum, but the problem of removing it was a great one. Finally the Culbertsons consulted James Kraft of the Kraft Cheese Co. (Mr. Kraft is also a rock enthusiast.) He suggested a trench be dug around the geyser to a depth of six feet. Then kerosene soaked rags were to be tied around the base and set afire. As soon as the rags had the base of the geyser terrifically hot, a barrel of ice water would be poured in the trench. It worked. The geyser's column snapped off cleanly and completely.

This specimen was sold to the Harvard University mineralogical museum and well be shipped there this month. The column weighs about 500 pounds and is a magnificent example of geyser formation. There is nothing like it in any other museum on earth. Estimated age of the geyser is 2,000,000 years. And the estimated length of time the geyser was in action is 10,000 years. This is determined by the thickness of the column and other factors in the structure of the geyser.

Pieces of the dendirtic chalcedony have been made into attractive cabochons by the Culbertsons. The stone has been nicknamed "Culbertstone"

The Culbertsons have a fine collection of precious and semi-precious gem stones from all over the world. They do much collecting in the Wyoming gem fields, where

any type of gem from jade to star sapphires may be found. "It is unfortunate," says Mr. Culbertson, "that the people of this state don't realize the tremendous value this state has in precious and semiprecious stones." We might add that the Sweetwater moss agate locale has alone yielded an estimated \$120,000 worth of moss agate over a period of years. And erosion continues to expose fine moss agate. The exact depth of this bed is not known, but it is expected to yield quantities of moss agate for many years in the future.

LETTERS TO THE EDITOR From page 2

"Gentlemen: Just read the first issue of the Earth Science Digest today and I will say I am very well pleased with it. I have already sent the extra subscription to one of my mineral friends and have written to two others about the magazine. I hope that you will have a lot of extra copies of the first issue as I know many people who will want a complete set. I would like to say I hope you will leave the format of the magazine exactly as it is. It is so aggravating to have the size of a magazine change.

I liked all of the articles very much, they are right down my alley. I hope that you will print articles of this nature in your future issues. I also hope that you will print material of interest to mineral and gem cutters in the large part.

Wishing you every success, I am

Yours truly, Henry Aarnes, Kansas City, Mo.

".... Your magazine has a good all around appearance."

Llovd M. Demrick, 1424 Grant Ave. San Francisco, Calif. To page 27

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GEMS AND MINERAL SPECIMENS

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URANIUM IN BRAZIL!

At a recent meeting of the Brazilian Academy of Science it was announced that deposits of Uraninite have been located at several places in the state of Paraiba. The Brazilian government is considerable funds in an effort to find expected to authorize expenditure of deposits of commercial value. Since much of Brazil remains unexplored mineralogically, there is some chance that large deposits of this important mineral may be found.

SIMPLE TEST FOR FOSSILS

An easy way to determine whether a bone is fossil or recent is simply to touch it to the tongue. If it sticks, it's fossil. If it doesn't, it's recent. This is because fossil bones are generally filled with minuce pores. Because of capillary action, the bone is highly absorbent and causes a "sticky" sensation when touched to the tongue. Another way of testing suspected fossils is by weight. Fossil bones are usually heavier than recent bones. This is sometimes due to replacement by lime carbonate or other minerals.

26 A COMET STRIKES THE EARTH *By H. H. Nininger* This little book is one of the most interesting publications concerning meteorites that has come out within the past few years. The book scalars how to recognize meteorites, how to collect them, and interesting facts about them. With each book is included, without charge, one genuine meteorite from the famous "Barringer Crater" at Canyon Diablo, Arizona. **DKITE NOW FOR YOUR COPY** Media complete with meteorite from Book complete with meteorite

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LETTERS TO THE EDITOR

From page 24

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> Forrest J. Parmenter, Charlestown, N. C.

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> Richard D. Wells, Los Angeles, Calif.

".... Please send me your rates for a ten year subscription. Your magazine interests me considerably."

> Mr. Visser, Den Haag, Holland

"..... Enclosed is my check for a three year subscription. Was quite pleased with your first issue. Am looking forward to future articles by Mr. Medlow."

> Robert Morris, Jr. Brooklyn, N. Y.

".... Am sure many of my acquaintances will want to subscribe to your magazine. There are many people in this region who are interested in minerals and rocks."

> W. L. DeVaney, Toledo, Oregon

".... Who is your proof reader? Noted a number of errors, but on the whole am pleased with the publication. Please enter my subscription for two years at \$3.75. Check enclosed."

> I. W. Dattilo, Kansas City, Mo.

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George Gates, Atlanta, Georgia

".... Please send me the Earth Science Digest for the next two years."

> Jay Weissberg, 660 West 180th St., New York 33, N. Y.

"Dear Mr. Bennett: We have received the first issue of your new publication, **The Earth Science Digest**, and find it most interesting. The format, style and subject matter are all equally commendable. We were especially pleased to note your book review column as we publish many geologic and paleontologic articles as a part of our Museum series.

We note on page 18 that you mention an expansion of size and number of articles in the forthcoming issues. We are looking forward to receiving the September issue, and if it appears consistently good as the first issue, then we shall recommend it to the State Librarian for subscription.

Thank you very much for the introductory copy, and please accept our sincere best wishes for a successful continuance of such a promising beginning."

> Dorothy V. English, Albany 1, New York Librarian of the New York State Museum,

".... Enclosed find my check for a years subscription to the Earth Science Digest. I have been looking for a magazine of this type to appear for some time."

> A. E. Harley, Kansas City, Mo.

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Notice to Advertisers

Our Advertisers are respectfully reminded that the advertising deadline is the tenth of the month preceding date of issue. All ads for the September issue should be in our office by August 10th. We will mail rate card upon request.

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SMITHSONIAN'S 100th

BIRTHDAY

On August 10th, the Smithsonian Institution at Washington D. C. was one hundred years old. The institution was founded in 1846. Strangely enough it wasn't an American who founded it. The founder was an obscure British chemist who had never visited the United States. His name was James Smithson, son of the Duke of Northumberland and a lineal descendant of King Henry VII. Upon his death he willed one-half millon dollars to the U. S. government 'o "found at Washington under the name c.' Smithsonian Institution, an establishment for the increase and diffusion of krewledge among men.'

No one knows just why Mr. Smithson chose the United States for the home of the institution. He d'dn't know anyone in this country and had no apparent reason for favoring the United States. The exact amount of the bequest was \$550,000. It was brought to New York in 1838 by the clipper ship Mediator. The money was in 105 bags each containing one thousand sovereigns with the exception of one bag which contained 960 sovereigns and miscellaneous cash. In those days this was a considerable amount of money and it was more than enough to provide an adequate start for this institution. Seventy five years after Mr. Smithson's death, Alexander Graham Bell brought Smithson's body to reside in the institution he founded. His tomb is just inside the north entrance of the building. What more fitting tribute could be given this "foreigner" who befriended the cause of science and whose institution has enabled dissemination of scientific knowledge on a large scale?

President Truman congratulated the institution on it's one hundreth birthday and advised it "to continue it's study toward the end that man should not only know better his early abode, but should acquire the means of knowing himself better, so that future wars and struggles among nations may be avoided and the world may live in complete harmony."

A special three cent stamp has been issued commemorating the institution's birthday. The first sheets have been set aside for presentation to Dr. Alexander Whitmore, the institution's secretary.



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